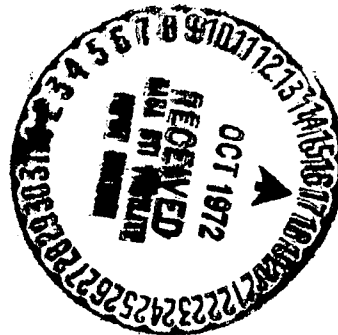


OBSERVATION OF THE DIMINUTION OF STAR BRIGHTNESS SEEN
THROUGH THE CENTRAL REGION OF BURNHAM'S COMET (1959)K)

F. Dossin

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ABSTRACT: The author has found on several occasions, while observing at the coudé focus 1.93 m telescope of the Haut-Provence Observatory, that the brightness of stars is weakened discernably when one observes these stars through the comet, quite close to the nucleus.

During the duration of the spectrographic observation of Burnham's Comet 1959 k at the Haut-Provence Observatory in April 1960, I, on several occasions, had the opportunity of establishing that the stars passing very close to the nucleus of this comet underwent quite a marked diminution of brilliance.

The observation conditions were the following: the focal length of the (193 cm) telescope in a coudé mount is 59 meters. The field of view corresponds to 9 angular minutes. The center of the head of the comet was maintained, by means of a drive in α and δ on the slit and at half-altitude of the latter, i.e., in the center of the field. The apparent displacement of the stars with respect to the comet was quite rapid, approximately 20 angular minutes per hour, which made good comparison possible between the apparent brightness of a star in two different locations of the field. The head of the comet fully covered the entire field of view because the photos show for the time of [least] geocentric distance a head of approximately 20-30 angular minutes diameter. Of course the brightness of the head was very strong in the vicinity of the center and a diffuse luminous spot [French word misspelled—literally: task] illuminated the central region of the field. In this spot [French word spelled correctly] one can see the stars "pass" without discernable change in luminosity. But when a star appears to have to pass nearly in coincidence with the nucleus of the comet, I more closely examined the aspects of the field so as to record accurately the position of the comet at the moment of the quasi-coincidence. It is under this circumstance that I saw the brightness of the star clearly weaken when it approached the nucleus, at a distance equal to twice the width of the slit or approximately 1 mm. This corresponds to approximately 4 seconds in the plane of the slit, or, for the comet (which was at 0.28 A.U. from earth), approximately 600 km.

I had my observations monitored by the night assistant Jean Figuière, a competent observer and better accustomed than I in estimating the brightness of the stars in the field of view of the instrument with which he has been working the entire year.

It also seemed to him that the brilliance of the star varied and increased by a quantity on the order of one and one-half magnitudes as it became more distant from the center of the comet towards the edge of the field.

We then observed several times the phenomenon during the course of this night and on subsequent nights, each time that a star approached quite close to the nucleus (which was little frequent otherwise). In all six or seven stars of magnitude close to 10 showed us the same weakening.

Burnham's Comet (1959 k) is not rich in dust. On all the spectra taken at Haut-Provence Observatory the continuum is slight and invisible, except on two spectrograms taken during excellent "seeing" and when it was possible to track a luminous central point of two angular seconds approximate diameter in the slit. These spectrograms contain a threadlike (filiform) continuum. It is possible that there was still an appreciable quantity of dust at 600 km from the nucleus.

The purpose of this note is simply to draw attention to the interest that accurate photometric observations would present of stars passing in the immediate vicinity of comet nuclei. A very long focal length is evidently indispensable for this effect. Some quantitative photoelectric determinations would naturally be more convincing than our visual observations.

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